

**2021 Town of Canmore
Greenhouse Gas Inventory
November 2022**

Executive Summary

This report details the Town of Canmore’s Greenhouse Gas (GHG) Inventory for 2021 emissions. Updating the GHG Inventory on an ongoing basis is the primary mechanism for the Town to evaluate its progress towards the GHG reduction targets set in the 2018 Climate Action Plan. The Town is also required to update its GHG Inventory as part of its membership in the *Global Covenant of Mayors for Climate and Energy* and the *Partners for Climate Protection Program*, which is managed by the Federation of Canadian Municipalities (FCM) and Local Governments for Sustainability (ICLEI).

The GHG Inventory for 2021 indicates that emissions decreased from the 2015 Corporate and Community baseline by 25% and 19%, respectively. This is positive progress towards the 50% and 30% Corporate and Community reduction targets for 2030. This significant decline is not likely to continue along the same trend, however, as much of the decrease in GHGs is due to the phase out of coal-fired electricity in Alberta and the resulting reduction in the carbon intensity of grid electricity, which is expected to level out in the coming years, and transportation emissions decreasing as a result of the COVID-19 pandemic.

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Introduction

The Climate Change Action Plan, adopted in December 2018, established 2015 as the baseline GHG Inventory. The 2015 baseline for Corporate GHG emissions (generated from Town of Canmore facilities and operations) is 10,492 tonnes, while the broader community GHG emission baseline is 273,747 tonnes. GHGs are measured in carbon dioxide equivalent (CO₂e), which is explained in the Methodology section.

The 2018 Climate Change Action Plan also set the following 2030 and 2050 reduction targets:

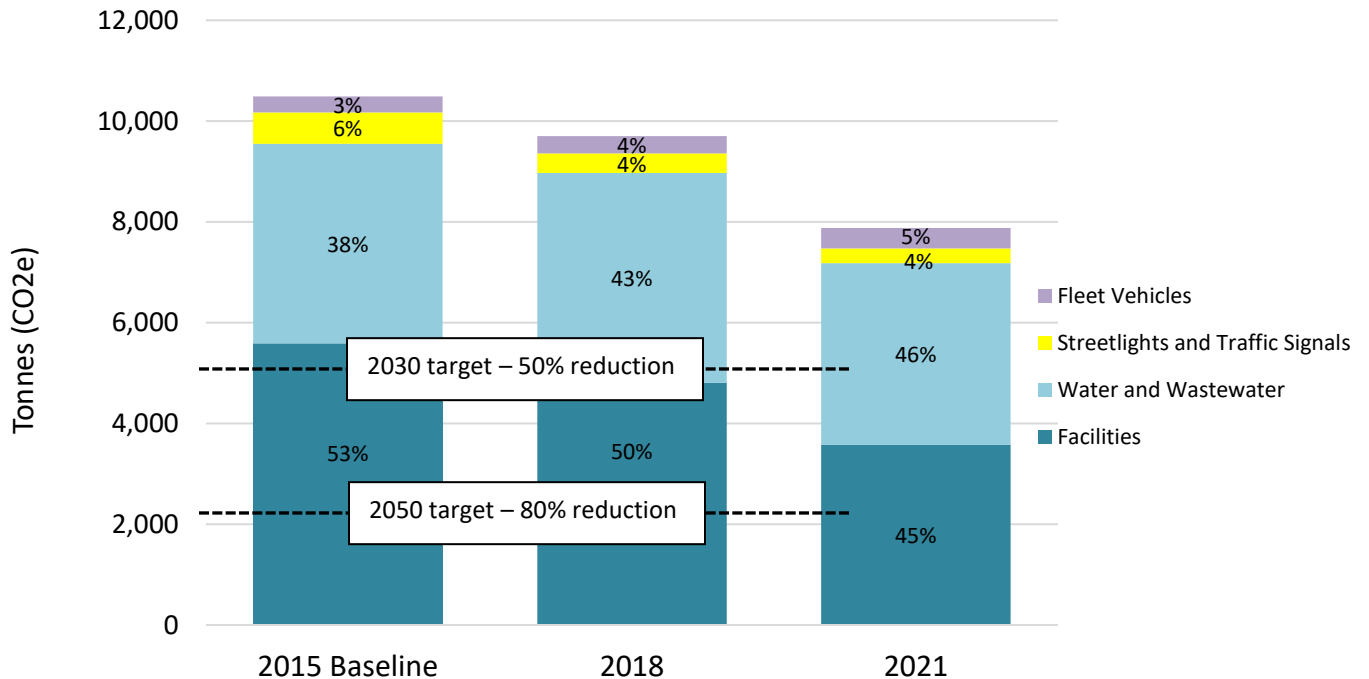
- By 2030, the community of Canmore will reduce its GHG emissions by 30% below 2015 levels;
- By 2030, the Town will achieve a 50% reduction in its Corporate emissions; and
- By 2050, Community and Corporate emissions will be reduced by 80% below 2015 levels.

2021 is the second complete update to the GHG Inventory since setting the 2015 baseline. The last comprehensive update was conducted for 2018. Going forward, it is planned that a complete GHG Inventory will be compiled every other year.

Corporate GHG Inventory Summary

The Corporate Inventory (Figure 2) accounts for emissions generated from Town of Canmore operations; Town-owned facilities, water and wastewater treatment and the vehicle and equipment fleet. The Town’s total Corporate GHGs in 2021 were 7,876 tonnes, a 25% reduction compared to 2015.

Figure 1: Town of Canmore Corporate GHG Inventory



Electricity consumption decreased by 13% in municipal facilities in 2021 compared to 2015. Approximately one-third of this decrease in electricity consumption is due to the investment in over 2,900 solar photovoltaic rooftop panels on various municipal facilities. In addition to solar panels providing a portion of the Town’s electricity needs, consumption was also lower because of intermittent closures of facilities due to the pandemic. Coupled with the decrease in carbon intensity of the Alberta electricity grid, this resulted in the significant decline in Corporate GHGs.

The pie chart in Figure 2 further breaks out the sources of 2021 Town of Canmore Corporate GHG emissions. Together, three buildings - the Wastewater Treatment Plant, Elevation Place and the Canmore Recreation Centre - produce 63% of all Corporate emissions. While lighting and space heating in these facilities account for some of the GHGs, most Town of Canmore emissions are associated with pumping and treating of drinking water and wastewater, maintaining ice rink surfaces, and warming and filtering water for the swimming pool.

Figure 2: Town of Canmore 2021 Corporate GHG Sources

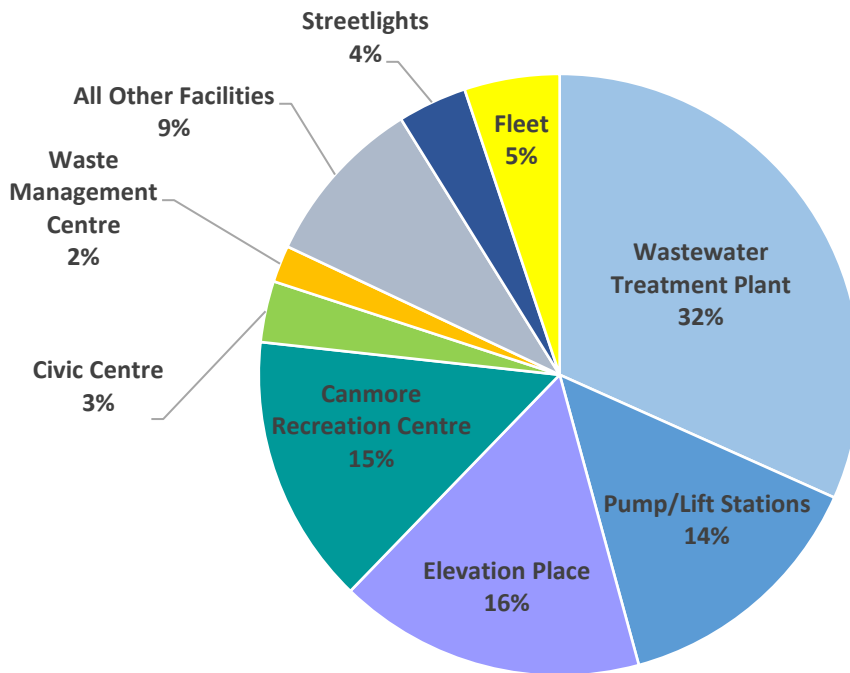
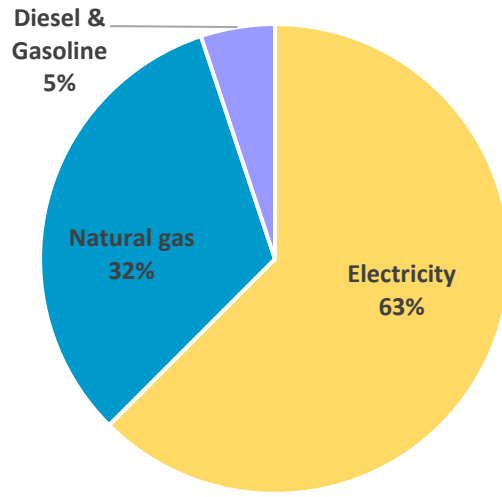


Figure 3 on the following page shows how Corporate GHGs are divided by fuel type. In total, the Town of Canmore spent \$335,246.33 on natural gas, \$1,417,191.08 on electricity and \$198,938 on gasoline and diesel for the vehicle and equipment fleet in 2021. These costs are expected to increase in the coming years with the increase in carbon pricing. The Town’s solar photovoltaic installations achieved direct electricity cost savings of \$22,863.83 in 2021. The Town also received \$8,412.41 in additional credit from exporting solar electricity to the grid, when the rooftop panels were generating more electricity than the buildings could utilize. The Canmore Recreation Centre system was not operational until September of 2021 so the Town can expect savings and revenue from solar to be higher in future years.

Figure 3: Town of Canmore 2021 GHGs by Fuel Type

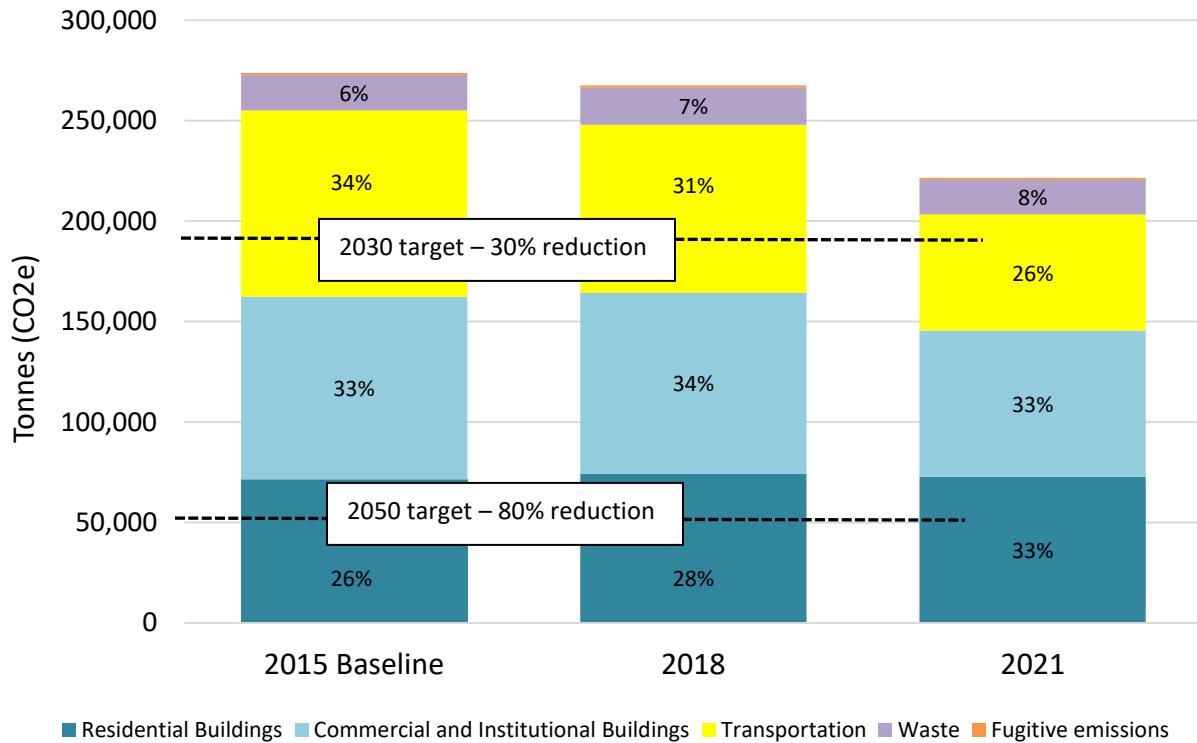


Community GHG Inventory Summary

The Community Inventory (Figure 4) includes emissions from heating and powering residential, commercial and institutional buildings, fuel consumed for transportation and emissions from waste generated within the municipal boundaries of Canmore. It also includes ‘fugitive’ emissions, which are released directly into the atmosphere during the extraction, production, processing and delivery of oil and natural gas, most often through equipment leaks, evaporation and flashing losses, venting, flaring, incineration, and accidental releases. While they are negligible compared to the rest of the inventory, municipalities are required to account for fugitive emissions associated with community natural gas consumption.

Canmore’s total community GHGs in 2021 were 221,594 tonnes, which is a 19% reduction compared to 2015. Town of Canmore Corporate emissions account for only 4% of total community GHGs.

Figure 4: Canmore Community GHG Inventory



As with the Corporate Inventory, much of the decline in Community emissions is attributed to the decrease in reduction in the amount of greenhouse gases emitted from grid electricity production due to the phase out of coal-fired electricity generation. While actual community-wide energy consumption in Canmore was 4% higher in 2021 compared to 2015, community building GHGs decreased by 10%. In addition, transportation emissions also significantly decreased. This is mainly attributed to the impact on travel patterns due to the COVID-19 pandemic. Fuel sales, which are used to estimate transportation emissions, have not returned to pre-pandemic levels. The decline in fuel sales has been noted across the country and is not isolated to Canmore.

It is estimated that the total community expenditure on natural gas and electricity was over \$38.5 million in 2021.

In addition to the Community GHG inventory, the following proxy data is also tracked. This enables the Town to monitor local trends in the interim years between the comprehensive GHG Inventory. Table 1 shows how local trends have increased or decreased from 2015 to 2021. Green text denotes positive trends that contribute to reduced greenhouse gas emissions, while red text denotes trends that move the Town farther from its climate targets.

Table 1: Canmore Energy, Transportation and Waste Data Trends from 2015 to 2021

Community-wide building energy	% increase or decrease
Electricity consumed (kWh)	4%
Natural gas consumed (GJ)	15%
Solar PV cumulative total installed capacity (kW)	2,006%
Transportation	
Motor vehicles registered to a Canmore address	1%
Hybrid and Plug-in Hybrid Electric Vehicles	160%
Battery Electric Vehicles	1,200%
Electric Vehicles and Hybrids as a percent of total vehicles	228%
Local Route 5 ROAM Transit ridership *	27%
Waste	
Solid waste landfilled (tonnes)	1%
Municipal facilities, streetlights, and water and wastewater energy	
Electricity consumed (kWh)	-13%
Natural gas consumed (GJ)	24%
Solar PV total installed capacity (kW)	101,200%
Municipal fleet fuel consumption	
B5 Diesel fuel (L)	35%
Gasoline (L)	14%

* 2017 is the baseline as it was the first full year of Roam Route 5

Green text: trends that reduce greenhouse gas emissions

Red text: trends that increase greenhouse gas emissions

Discussion

In addition to Climate Action Plan initiatives undertaken by the Town, there will be external factors impacting this and future GHG inventories. As mentioned previously, a significant external influencing factor is the carbon intensity of electricity. This is a measure of the amount of GHG emissions produced by electricity generation and is used when calculating inventories. Alberta has the most GHG-intensive electrical grid in Canada, due to coal-fired generation. With the phase out of coal as a fuel source, this has been decreasing since 2015. As a result, community GHGs are down even though there was an increase in actual energy use. This shows the significant influence of senior levels of government on local GHGs, and the continued need to call upon the Provincial and Federal governments for climate leadership.

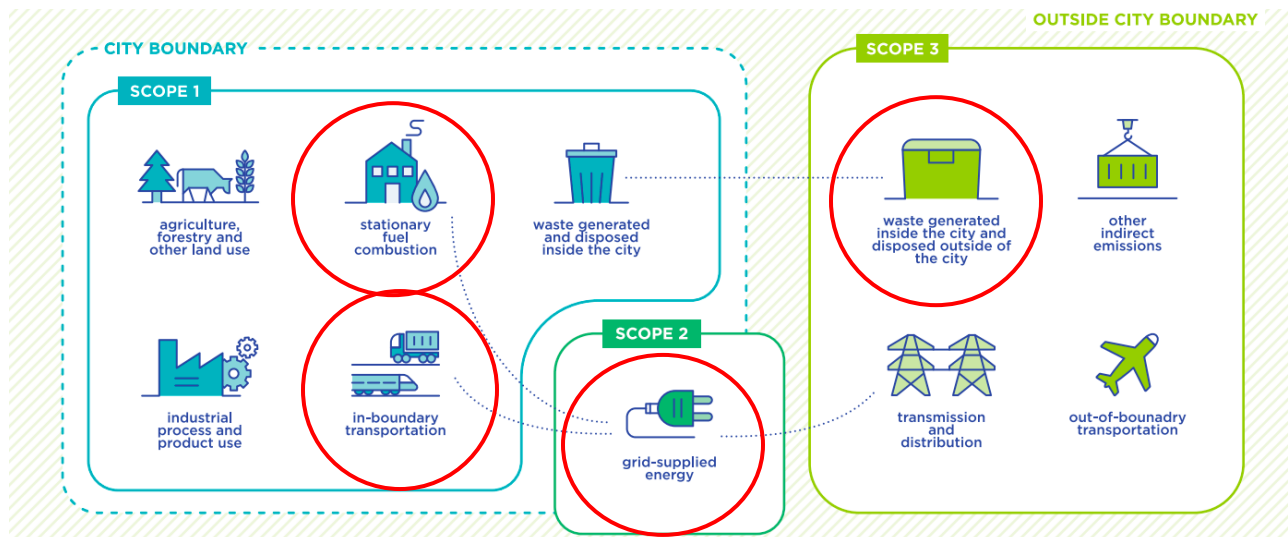
While solar and wind power electricity generation is increasing across Alberta, natural gas will be the predominant replacement for coal. The significant decline in grid carbon intensity is expected to level out in the next few years. Alberta will, however, remain amongst the highest in Canada which means that local initiatives aimed at reducing electricity consumption remain a priority. Planned actions include a continued investment in solar PV as well as a study aimed at reducing energy demand and exploring renewable and low carbon options for the water and wastewater infrastructure.

Methodology

The scope of what is included in Canmore’s greenhouse gas inventory is dictated by the *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories* (GPC), created by the World Resources Institute, C40 Cities Climate Leadership Group and ICLEI. Hundreds of cities across the globe use the GPC to report their greenhouse gas emissions.

Under the GPC, municipalities can elect to do a BASIC level, which reports on standard emission sources in a city, or a BASIC+, which includes emission sources such as industrial and agricultural processes and transboundary transportation. BASIC+ are more complex, requiring increased data availability and are generally more applicable for larger centres. The figure below from C40 Cities shows how the GPC has organized sources and boundaries of municipal GHG emissions into different emission scopes. The red circles have been added to indicate the sources included in the Community inventory. Like most municipalities, the Town of Canmore reports at the BASIC level, which includes stationary fuel combustion in buildings, grid-supplied energy, in-boundary transportation and waste generated inside the city and disposed of outside of the city.

Figure 5: Sources and boundaries of GHG emissions sources for municipal GHG inventories



Source: C40 Cities, https://www.c40knowledgehub.org/s/article/Consumption-based-GHG-emissions-of-C40-cities?language=en_US

The 2021 inventory was completed using the Partners for Climate Protection Milestone Tool, a web-based GHG emissions inventory calculator. The tool was developed by ICLEI Canada, follows the GPC and uses emissions factors from the Canadian government’s national GHG inventory, which is submitted to the United Nations Framework Convention on Climate Change (UNFCCC).

Greenhouse gas emissions accounted for in the inventory include carbon dioxide (CO₂), nitrous oxide (N₂O) and methane (CH₄). As GPC protocols dictate, all have been reported as carbon dioxide equivalent (CO₂e). While there are fewer CH₄ and N₂O emissions compared to CO₂, they absorb more thermal infrared radiation and therefore have an increased contribution to global warming or global

warming potential (GWP). For instance, N₂O has 298 times the GWP as CO₂. To account for the difference in GWP, these emissions are converted into CO₂e, which is the amount of CO₂ which would have the equivalent GWP.

Data Sources

Corporate Inventory data sources:

- Electricity and natural gas consumption for all Town-owned facilities.
- Electricity and natural gas consumption for water and wastewater infrastructure.
- Electricity for street and traffic lights.
- Diesel and gasoline used by fleet vehicles and equipment.

Community Inventory data sources:

- Electricity and natural gas consumption for all residential, commercial and institutional buildings within the Town of Canmore's municipal boundaries. Local electricity data provided by Fortis is not broken down by building sector. The split between residential and commercial/institutional building GHGs in our inventory is estimated from provincial electricity and natural gas consumption for these sectors, as reported by Natural Resources Canada.
- Total diesel and gasoline sales volumes from Canmore gas stations.
- ROAM transit fuel use.
- Electric vehicle charging stations, where separate data is available.
- Estimated propane, based on extrapolated provincial data, as local propane sales data is not available.
- Landfilled waste, yard and garden material diverted to composting.
- Wastewater volumes.

Excluded GHG sources

GHG inventories are constrained by the availability and quality of data. They are also dictated by specific protocols in order to provide consistency and comparability. As a result, they do not quantify all potential sources of GHGs. It is prudent to note that because of the following excluded sources of GHGs, the actual Canmore GHG footprint will be higher than what inventories indicate.

Excluded Corporate GHGs:

- Any employee travel not occurring in a Town fleet vehicle (e.g. flying to a conference).
- Waste generated in Town of Canmore buildings. While some municipalities are able to include this in their Corporate inventories, Town of Canmore operational waste is not tracked separately from the broader community's. GHGs from waste generated by employees, Town operations and users in recreational facilities is included in the Community inventory.

Excluded Community GHGs:

- Upstream emissions associated with the production and transportation of food, consumer goods and services
- Embodied carbon in building materials.

- Domestic and international air travel by residents.
- Emissions specific to tourism. Energy consumed at hotels and other visitor accommodations, fuel purchases by visitors at local gas stations and waste landfilled as part of the local collection system is captured in the inventory. The broader transportation impact of local and international visitors traveling to Canmore, however, is not accounted for.
- Fugitive emissions from discharges or leaks in wastewater treatment and refrigerants.

Notable Areas of Uncertainty

The biggest decline in community GHGs was from transportation, which account for about one third of the total Community Inventory. Transportation emissions are estimated from local fuel station sales volumes, which decreased in 2021. While this is an acceptable method prescribed by the GPC protocol, it contains inherent uncertainty. It does not capture Canmore residents and visitors that are fueling vehicles in other communities and, conversely, includes Trans-Canada Highway travelers only stopping in Canmore for fuel. The 2021 GHG Inventory indicates that 26% of total community emissions come from transportation. In comparison, the Town of Banff completed a more robust inventory in 2019 incorporating park visitation statistics and traffic counter data. Using this additional data, their transportation GHGs are much higher: 51% of their total community emissions come from visitor vehicles and 5.8% from local vehicles.

Conclusion

The 2021 GHG inventory estimates a decrease in emissions from the 2015 baseline: 25% for Corporate emissions and 19% for Community. While this decline in GHGs over the 6 years since the baseline is positive, much of the reductions are due to the declining carbon intensity of the provincial electricity grid, which is anticipated to level out in the coming years, as well as the impact of COVID-19 on travel. With anticipated population increase and development expected in Canmore between now and 2030, continued and aggressive action is required to reach the Town's 50% Corporate and 30% Community reduction targets. It should be noted that at the time these GHG reduction targets were adopted, they mirrored the federal government targets, as is standard practice amongst municipalities and recommended by the *Global Covenant of Mayors for Climate and Energy* and *Partners for Climate Protection Program*. The federal government has since updated Canada's GHG targets to 40-45% reduction by 2030 compared to 2005 levels and net zero emissions by 2050.

The GHG inventories should be considered living documents. As previously discussed, there is inherent uncertainty as well as external influences. Over time, better data may become available, and protocols may be further refined and changed. The emission factors used to calculate GHGs are subject to updates and it is possible that retroactive changes to previous inventories may be required. The GHG inventories are an important tool to guide decision making and provide value in highlighting how different sectors compare to each other, but specific GHG tonnages should always be considered an estimate.

While the next comprehensive GHG Inventory is not planned for until 2023 (reported in 2024), the proxy data included in this report is tracked annually. Energy consumption, transit ridership, waste diversion and other data can provide a good picture of how the factors that influence GHGs are changing in response to the Climate Action Plan initiatives being implemented.